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# Varieties of Hard Red Winter Wheat in the United States



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# Varieties of Hard Red Winter Wheat in the United States<sup>1</sup>



By L. P. REITZ, *senior agronomist*, and C. O. JOHNSTON, *pathologist*, *Field Crops Research Branch, Agricultural Research Service*

## HARD RED WINTER WHEAT

Hard red winter wheat makes up the largest and, in many respects, the most important commercial class of wheat in the United States. About one-half of the total wheat acreage in the United States is occupied by this class. Approximately 46 million acres were grown in 1949, near a record acreage for any single year. Some varieties rank among the most winter-hardy and drought- and heat-resistant wheats of the world. Hard red winter wheat is grown for the most part in areas of limited rainfall where the soils are relatively high in available nitrogen; both conditions are conducive to the production of grain of high protein content. With the possible exception of spring wheat grown in certain areas, hard red winter wheat has the highest protein content of the market classes of wheat and hard red winter varieties are among the best for bread making. Hard red winter wheat grown in areas that produce high-protein grain is used extensively for blending with wheat of low protein content.

The information given herein on hard red winter wheat varieties was gathered from several sources, including the following: (1) Varietal experiments conducted by the Section of Cereal Crops and Diseases, Field Crops Research Branch, Agricultural Research Service, United States Department of Agriculture, in cooperation with one or more State agricultural experiment stations; (2) classification studies of American wheat varieties; (3) surveys of the wheat varieties of the United States in cooperation with the Agricultural Estimates Division, Agricultural Marketing Service, based on returns from questionnaires sent to crop correspondents at 5-year intervals; (4) several years of observations by the writers of the wheatfields in the States where these varieties are grown; and (5) milling and baking experiments conducted by the Section of Cereal Crops and Diseases in cooperation with the Grain Division, Agricultural Marketing Service, and with State agricultural experi-

<sup>1</sup>This circular contains some material previously included in *Farmers' Bulletin 1806, Hard Red Winter Wheat Varieties*, by K. S. Quisenberry and J. Allen Clark, which is out of print.

ment stations. Data on acreage and figures, showing the distribution of wheat varieties in 1949, are from United States Department of Agriculture Circular No. 861.

Seed of the first hard red winter wheat variety was introduced from Russia in 1873. Numerous varieties have been brought in from Russia and other foreign countries since that time, and many others have been developed in the United States by selection or by hybridization followed by selection. Some of these are so similar that they cannot be distinguished by their out-

ward appearances. Other varieties are easy to identify. Most of the hard red winter varieties are bearded and have white glumes, hard red kernels, and rather weak straw. In recent years the acreage of beardless varieties has increased, and some varieties with either black or brown glumes or with stiffer straw have become important. Hard red winter wheat varieties are able to produce fairly high average yields under the extremely variable climatic conditions of the Great Plains, largely because of their winter hardiness, drought resistance, and early maturity.

## ADAPTATION

The hard red winter wheats are best adapted to the central and southern sections of the Great Plains where the annual rainfall is less than 35 inches. The States of this area leading in production are Kansas, Oklahoma, Texas, Nebraska, and Colorado. A rather large acreage also is grown in eastern New Mexico (fig. 1). In this region there is little competition with other classes of

wheat. Eastward, where there is a higher annual rainfall, they come into competition with soft red winter wheats. In extreme eastern Kansas and Oklahoma, northern Missouri, and southwestern Iowa, where the annual rainfall varies from 30 to 40 inches, hard red winter wheats predominate on the higher, drier, and less fertile soils; whereas the soft wheats occupy a part

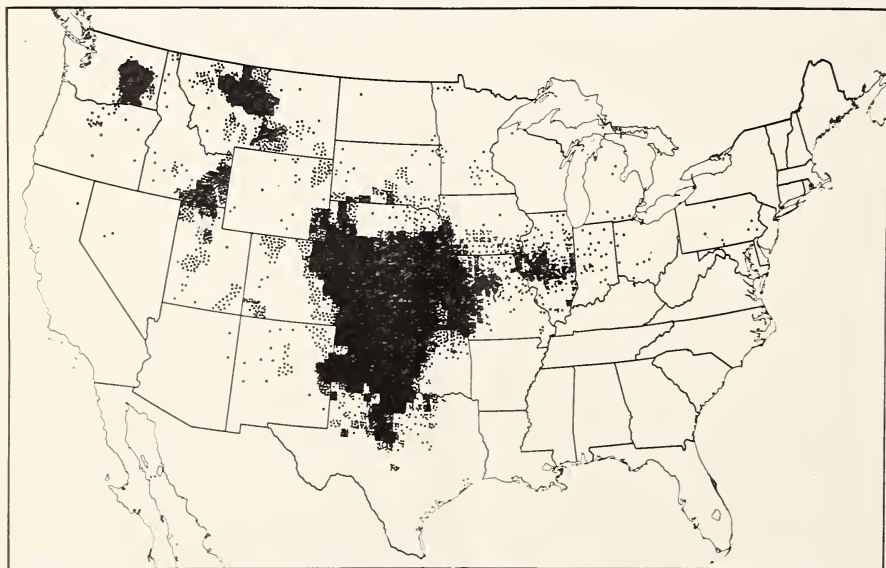


Figure 1.—Distribution of hard red winter wheat in 1949. Each dot represents 2,000 acres. Total estimated area, 46,042,742 acres.



of the acreage on the lower, more productive soils where lodging is more likely to occur. The hard red winter wheats are grown to a considerable extent in central Illinois and to a limited extent in northwestern Indiana, because of their greater winter hardiness as compared with other classes.

The hard red winter wheats are grown in some of the drier sections of Washington, Oregon, Idaho, and Utah, where the annual rainfall is 15 inches or less. They are grown extensively in

central Montana and less extensively in Wyoming, South Dakota, and Minnesota. In recent years the acreage of winter wheat in these northern areas—excepting Minnesota—has tended to increase somewhat because of the development of more winter-hardy varieties and better methods of growing them. Spring wheats are more important in North Dakota and in most parts of South Dakota, Minnesota, and eastern Montana.

## REGIONAL DISTRIBUTION OF VARIETIES

The number of distinct varieties of hard red winter wheat grown in the United States has increased gradually from a single variety in 1873 to more than 50 at present. Thousands of selections made in the United States from old varieties and from hybrids and many introductions from foreign countries have been tested at agricultural experiment stations throughout the area during the last 40 years, but only a few of the best have been named, increased, and distributed. Some of the older varieties are known under several names, but in recent years—because farmers have become better acquainted with wheat varieties—the number of synonyms has been reduced. The identification of certain varieties is often difficult, as several have the same external characters and can be distinguished only by field performance. Many of the newer ones have distinct characteristics of head, grain, or plant, so that identification is more certain.

Since 1930 a coordinated improvement program has been in operation in all of the important hard red winter wheat States, the work being cooperative between State and Federal agencies. In this program, new varieties are bred and tested thoroughly for disease and insect resistance, market quality, and agronomic characters. Since the ability to survive the winter and to produce a high yield of good quality grain

can be determined only by widespread tests, new varieties developed by public agencies are not recommended and distributed to farmers until after they have been tested at a number of stations for several years and are known to be of good quality. A few varieties have been released by private breeders without such thorough evaluation. Varietal recommendations are made according to areas of adaptation, which may include parts of one or more States.

Hard red winter wheat varieties differ greatly in adaptation; however, they may be placed roughly into groups corresponding to three large ecological zones, or areas of production, in the United States. These areas are (1) the central and southern Great Plains from Nebraska and Colorado southward, (2) the Intermountain and Western States from Montana and Wyoming westward, and (3) the Northern and Midwestern States. Turkey, Pawnee, Nebred, Cheyenne, and a few other varieties are grown in more than one area. Varietal responses to climatic conditions are the chief determining factors in this distribution, although resistance in a few varieties to particular diseases or insects makes them especially suited to some sections. The principal varieties grown in each of these general areas are listed in table 1 in their approximate order of relative importance.

TABLE 1.— *Principal varieties of hard red winter wheat grown in the 3 general areas of production in the United States, 1949*

Central and southern Plains States	Intermountain and Western States	Northern and Mid-western States
Pawnee.....	Turkey.....	Pawnee.
Comanche.....	Yogo.....	Turkey.
Triumph.....	Karmont.....	Nebred.
Wichita.....	Wasatch.....	Brill.
Tenmarq.....	Cache.....	Purkof.
Westar.....	Rio.....	Iowin.
Early Blackhull.....	Newturk.....	Minturki.
Cheyenne.....	Ridit.....	Iobred.
Turkey.....	Cheyenne.....	Marmin.
Blackhull.....	Sherman.....	Minter.
Nebred.....	Utah Kanred.....	Iohardi.
Red Chief.....	Montana No. 36.....	

Greater detail of distribution is given in connection with a discussion of each of the varieties. Likewise, State agricultural experiment stations and crop improvement associations maintain current lists of recommended varieties of good quality for local use.

The principal varieties of hard red winter wheat are listed in table 2 in order of the estimated acreage in 1949 for the United States as a whole. The percentage each occupied at 5-year intervals from 1919 to 1949 is also shown. It is readily apparent that Pawnee, Comanche, and Triumph were the most

widely grown varieties in 1949. Not one of the three was grown commercially to any extent before 1944, whereas in 1949 they comprised 49.5 percent of the estimated acreage used for hard red winter wheat production in the United States. Turkey, for many years the leading variety, ranks fourth in the table and appears to be declining in all areas. A number of varieties have been released so recently that they do not appear at all in the survey or are on very small acreages. In years to come these may occupy prominent places in the wheat acreage of certain States.

## HISTORY AND CHARACTERISTICS OF THE VARIETIES

Wheat varieties may differ from one another in a number of ways. Differences in awn and beak length, glume color and markings, grain color, and kernel size, shape, and density aid in identifying the varieties. Varieties that appear more or less alike, however, may differ greatly in such characteristics as time of maturity, winter hardiness, strength of straw, disease

and insect resistance, productivity, and market value.

The origin, general description, adaptation, and special qualities of 39 important hard red winter wheat varieties and of several minor ones are given in the following pages. The more important varieties are discussed in the order of their 1949 acreage, as shown in table 2.



TABLE 2.—Percentage of the total hard red winter wheat acreage occupied by each variety in the United States at 5-year intervals since 1919, and the estimated acreage for 1949

[An asterisk (\*) indicates the variety was reported as grown, but the estimated acreage was less than 0.1 percent of the total acreage of that class]

Variety	Percentage of acreage							Acreage, 1949
	1919	1924	1929	1934	1939	1944	1949	
Pawnee.....						0.1	24.3	11, 120, 653
Comanche.....						.1	13.0	5, 931, 718
Triumph.....						.2	12.2	5, 596, 200
Turkey.....	99.4	70.5	59.5	55.9	42.0	27.1	7.2	3, 311, 617
Wichita.....							6.6	3, 004, 432
Tenmarq.....				.7	11.7	28.6	6.3	2, 902, 645
Westar.....							4.8	2, 169, 798
Early Blackhull.....			(*)	.3	1.1	5.5	4.6	2, 106, 295
Cheyenne.....				.2	2.5	4.6	4.3	1, 940, 510
Blackhull.....	(*)	7.5	22.7	25.1	27.0	15.0	3.9	1, 786, 492
Nebred.....						1.9	3.2	1, 457, 375
Red Chief <sup>1</sup> .....						2.7	2.5	1, 160, 893
Yogo.....					.1	.5	1.2	562, 186
Karmont.....		(*)	.3	.3	.4	.6	1.1	511, 371
Chiefkan <sup>1</sup> .....					1.6	5.7	.9	425, 270
Wasatch.....						(*)	.9	393, 788
Kanred.....	0.5	21.2	13.0	10.9	5.1	3.3	.6	252, 049
Cache <sup>1</sup> .....						.1	.3	154, 464
Blue Jacket.....							.3	124, 015
Rio.....				(*)	.1	.1	.3	114, 948
Iowin.....			(*)	(*)	.4	.4	.2	94, 873
Newturk <sup>1</sup> .....			.1	.1	.2	.2	.2	82, 045
Ridit <sup>1</sup> .....		(*)	.6	.6	.4	.2	.2	75, 027
Brill.....					(*)	.1	.2	71, 396
Iobred.....		(*)	.4	.4	1.6	.7	.1	68, 427
Purkof <sup>1</sup> .....			.8	1.1	1.2	.5	.1	62, 835
Utah Kanred.....				.1	.2	.1	.1	42, 962
Nebraska No. 60.....		.1	1.3	2.4	1.4	.6	.1	39, 717
Sherman.....			(*)	(*)	(*)	(*)	.1	39, 490
Minturki.....		.2	.3	.6	.5	.5	.1	32, 591
Marmmin.....						(*)	.1	21, 356
Other varieties.....	(*)	.5	.9	1.0	2.3	.6	.....	81, 776
Varieties not reported in 1944 and 1949.....	.1	(*)	.1	.3	.2	.....	.....	.....
Total reported.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	45, 739, 214
Varieties not reported.....								303, 528
Total.....								46, 042, 742

<sup>1</sup> Awnless, or beardless, varieties.

## Older Established Varieties

Among the 44 varieties commercially grown in 1949 were 12 which occupied more than a million acres each. Pawnee, Comanche, and Triumph ac-

counted for about half of the entire acreage. Prominent as these are, they do not detract from the significance of other varieties that make the produc-

tion of hard red winter wheat possible in some areas or at least more profitable. A discussion of the varieties follows.

## PAWNEE

Pawnee is a selection from a Kawvale  $\times$  Tenmarq cross made at the Kansas Agricultural Experiment Station, Manhattan, in 1928. In the fall of 1931, some  $F_3$  plant selections of the cross were sent to the Nebraska Agricultural Experiment Station, Lincoln, where they were tested and reselected. The best strains were then grown in yield trials. Because of its outstanding performance in Nebraska, the selection now known as Pawnee was entered in cooperative nursery yield tests in the central and southern Great Plains in 1935. From then until it was released by Nebraska in 1942 and by Kansas in 1943, it was tested thoroughly in cooperative nursery and plot experiments conducted over the hard red winter wheat region. The variety was developed cooperatively by the Nebraska

and Kansas Agricultural Experiment Stations and the United States Department of Agriculture.

Pawnee has glabrous (nonhairy), white glumes; a rather dense, awned spike; medium to short beaks, or points, on the outer chaff; and short, hard red kernels (fig. 2, *A*). It is a stiff-strawed, short-growing variety with high tillering capacity. It ripens 2 or 3 days earlier than either of its parents and about a week earlier than Turkey. It is resistant to the strain of hessian fly most commonly present in the hard red winter wheat region, moderately resistant to bunt, highly resistant to loose smut, and somewhat resistant to leaf rust. It is slightly resistant to stem rust and often is able to escape severe damage from that disease. However, neither Pawnee nor any other variety of wheat described in this circular is resistant to the race of stem rust known as 15B. It lacks resistance to eastern types of mosaic. The variety is slightly less winter-hardy than Turkey or Khar-kof and it has a tendency to shatter, but



Figure 2.—Typical spikes of Pawnee (*A*) and Comanche (*B*).

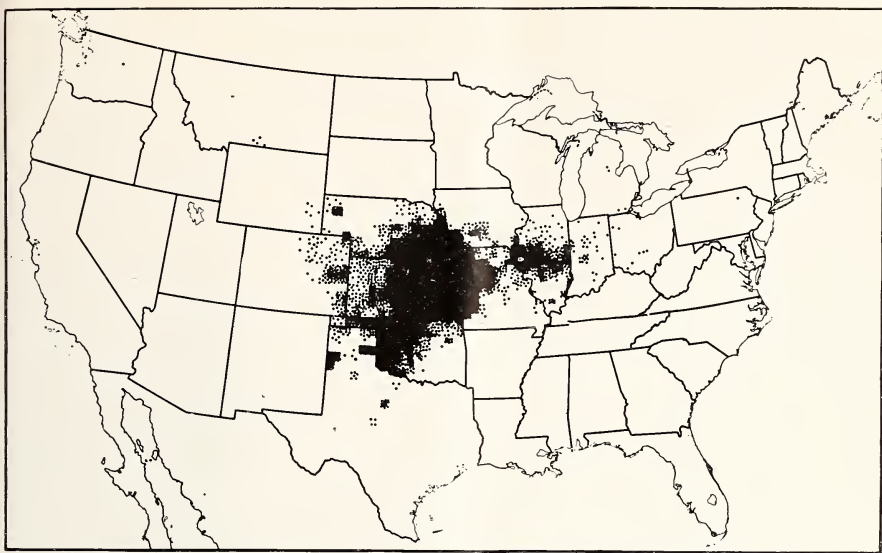


Figure 3.—Pawnee distribution in 1949 was 11,120,653 acres.

in yield tests it has been outstanding from the Platte River in Nebraska to and beyond the Red River of Texas.

The test weight per bushel is heavier than that of Turkey, but the grain is inclined to be somewhat light in color and it tends to bleach easily. Milling and baking tests indicate that Pawnee has good quality, being substantially equal to Turkey. The dough requires a shorter mixing time than that of Turkey or Tenmarq.

In 1944 Pawnee was reported on more than 11,000 acres in Nebraska and Kansas, but it has increased rapidly since that time. It became the leading variety in the eastern half of Nebraska and Kansas in 1947 and was reported as being grown on 35 percent of the acreage of Kansas in 1948. In 1949 it became the leading variety of wheat grown in the United States, comprising 13.1 percent of the acreage of all wheat and 24.3 percent of the hard red winter acreage, or a total of 11,120,653 acres, as shown in figure 3. The variety has spread westward beyond the area of its best adaptation. It is grown also in the soft wheat areas of Missouri, Illinois, and Indiana, where it is unpopular with

some millers because of its hard texture. Pawnee is recommended for Nebraska, Colorado, Kansas, and Oklahoma.

## COMANCHE

Comanche is another variety developed and tested in the cooperative hard red winter wheat improvement experiments. It originated as a selection from an Oro  $\times$  Tenmarq cross made at Manhattan, Kans., in 1928. Since 1937 Comanche has been tested extensively in uniform nursery and plot experiments at stations in the central and southern Great Plains region and to some extent elsewhere. Thus, its characteristics were well known when it was released in Kansas, Oklahoma, and Texas in 1942.

The superior characteristics of Comanche are high yield, heavy test weight, earliness, milling and baking quality equal or superior to Turkey, and high resistance to some races of leaf rust and stem rust. The straw is stronger than that of Turkey but weaker than Tenmarq. The variety ripens about the same time as Pawnee or about a week earlier than Turkey.

It is susceptible to loose smut and hessian fly. It possesses only moderate winter hardiness and, therefore, cannot be expected to thrive north of the area where Blackhull and Tenmarq do well. Comanche is rather similar to Tenmarq, having white chaff and moderately long beaks, but it is slightly shorter, has a higher test weight, is resistant to bunt, ripens a few days earlier, and produces more grain per acre in its area of adaptation (fig. 2, B).

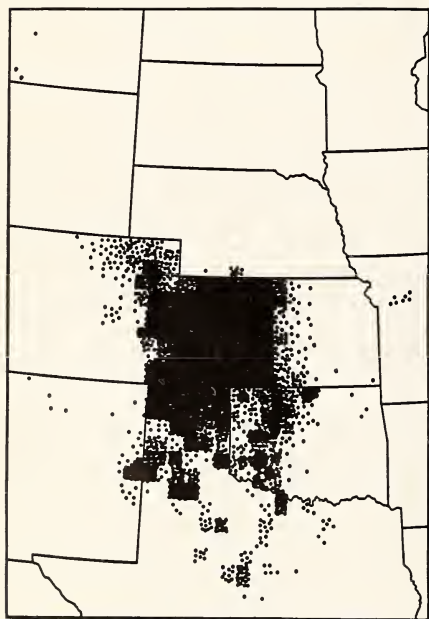


Figure 4.—Comanche distribution in 1949 was 5,931,718 acres.

The acreage of Comanche increased rapidly after its release. In 1944 it was reported as being grown on more than 21,000 acres but had increased to almost 6,000,000 acres by 1949, as shown in figure 4. Exceeded only by Pawnee in Kansas, sizable acreages are being grown also in Oklahoma, Texas, New Mexico, Colorado, and Nebraska. Comanche has replaced much of the acreage of Blackhull, Chiefkan, and some of that of Red Chief in western Kansas,

western Oklahoma, and the Texas Panhandle. It is recommended in Kansas, Oklahoma, Texas, New Mexico, Colorado, and Nebraska.

## TRIUMPH

Triumph, often called Early Triumph and erroneously Early Premium, was developed by Joseph Danne of El Reno, Okla., and distributed in 1940. The parentage has not been revealed, but the original Triumph was a direct descendant of a freak plant discovered by Mr. Danne in 1927. Further breeding culminated in the present strains.

Triumph is a good-yielding variety. It matures about 5 or 6 days earlier than Pawnee or Comanche, making it one of the earliest hard red winter wheats now grown. It is a bearded, dense-headed, short-beaked variety with white glumes (fig. 5, A). The kernels are midlong, symmetrical, and tapering. The straw is short and rather stiff. The variety is susceptible to leaf and stem rust and to bunt, but it appears to have some resistance to loose smut. Because of its earliness, Triumph frequently escapes heavy rust damage. The cut kernels give the appearance of being soft, but the variety has acceptable hard wheat milling and baking characteristics, giving a low ash flour with splendid properties for family trade use.

Triumph has spread rapidly, being grown principally in the western half of Oklahoma and Kansas, in eastern Colorado, and northwestern Texas, where very early types are desired for at least a part of the acreage. In 1949 it was reported as growing on about 12.2 percent of the acreage devoted to hard red winter wheat or more than 5 million acres, as shown in figure 6. Northward extension of the variety is limited by winterkilling and by freezing injury to the developing heads and grains in the spring. The variety is recommended in Kansas, Oklahoma, and Texas.





Figure 5.—Spikes representing Triumph (A) and Turkey (B).

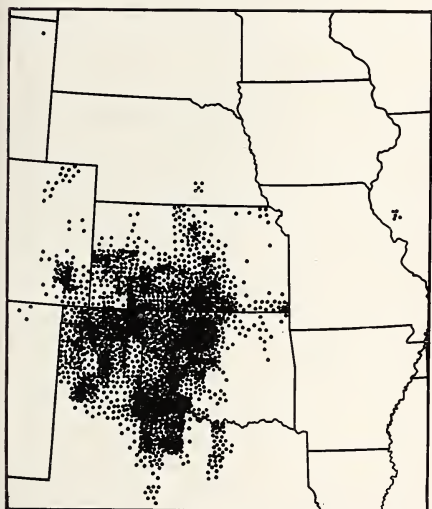


Figure 6.—Triumph distribution in 1949 was 5,596,200 acres.

## TURKEY AND KHARKOF

Turkey, for many years the most widely grown variety and long consid-

ered the standard of high grain quality, ranked fourth in acreage planted in 1949. It is known also by many other names, some of the more common being Alberta Red, Crimean, Improved Turkey, Kharkof, Malakof, Pioneer Turkey, Red Russian, Russian, and Turkey Red. The variety, as originally introduced from Russia about 1873 and as now grown, contains a number of strains and is more a type than a variety. Many selections have been separated by plant breeders and distributed as new and improved varieties.

Turkey has the general characteristics of the varieties originating in Crimea. The heads are bearded, the chaff is white, and the grains are hard and dark red, long, and slender. The beaks are about one-eighth to three-eighths of an inch long (fig. 5, B). As with other varieties of the Crimean group, the straw is rather weak and inclined to lodge when grown on fertile soil with high rainfall. Turkey is com-



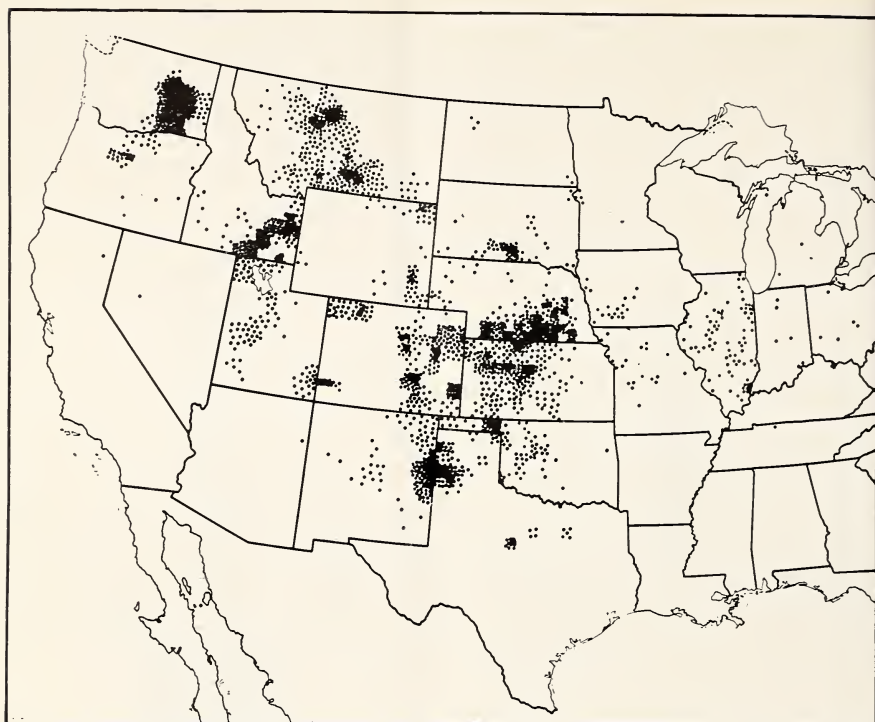


Figure 7.—Turkey distribution in 1949 was 3,311,617 acres.

paratively winter-hardy and drought-resistant.

In 1949 Turkey occupied 3,311,617 acres in 29 States, with the largest acreages in Washington, Nebraska, Colorado, Idaho, Kansas, New Mexico, Oklahoma, Montana, Utah, and Texas (fig. 7). It was the leading variety in Idaho and Washington. In Kansas, Nebraska, Oklahoma, Texas, New Mexico, and Colorado, Turkey is being replaced by new varieties such as Pawnee, Comanche, Wichita, Cheyenne, and Nebred. The wide adaptation of the variety is emphasized by the fact that it was recommended by the agricultural experiment stations of 14 States. It is known, however, that there is considerable variation among the various strains called Turkey. Until the recent distribution of a number of new varieties, Turkey was regarded as the highest yielding variety for most of the area.

It is still regarded as a good variety, especially north and west of the area of heavy production of hard red winter wheat, in Wyoming and South Dakota, and in certain sections of Montana, Washington, and Idaho. In the more humid parts of the hard red winter wheat belt several varieties of soft or semihard red winter wheat are generally regarded as better than Turkey.

The name Kharkof was applied to an introduction of Crimean wheat brought to this country from Starobielsk, Kharkof, Russia, in 1900 by the late Mark Alfred Carleton of the United States Department of Agriculture. That section is north of the area from which the original Turkey wheat came, and consequently it was thought for many years that Kharkof was more winter-hardy than Turkey. In the earlier experiments it gave better yields than Turkey, but since 1915 very little difference in

hardiness or yield has been observed. It is now considered a strain of Turkey. The variety was widely distributed by the United States Department of Agriculture and several State agricultural experiment stations in the early years of the present century. The acreage grown in 1949 has been included with that reported for Turkey.

Montana No. 36 is the name used for a selection from Kharkof that is identical with Turkey and Kharkof in all observable characteristics. It was distributed by the Montana station in 1915 and has been grown to a limited extent in that State, occupying 15,952 acres in 1949.

## WICHITA

Wichita was selected from an Early Blackhull  $\times$  Tenmarq cross made at the Kansas Agricultural Experiment Station, Manhattan, in 1929. The final selection was made in 1935. The Kansas, Texas, Oklahoma, Nebraska, and Colorado Agricultural Experiment Stations and the United States Department of Agriculture cooperated in the testing of the variety, which was distributed in Kansas and Texas in 1944 and in Colorado and Oklahoma in 1943.

The superior characteristics of Wichita are early maturity, high yield, heavy test weight, and more satisfactory quality than Early Blackhull, a variety it should replace. Wichita is very susceptible to leaf and stem rust, but its early maturity frequently enables it to escape serious damage. The variety is about 1 day later than Early Blackhull but about 5 or 6 days earlier than Tenmarq, 3 or 4 days earlier than Pawnee or Comanche, and 7 or 8 days earlier than Turkey. The straw is rather weak, although stronger than Early Blackhull. While almost as winter-hardy as Tenmarq, it is not sufficiently cold tolerant for use in the northern half of the Plains. The heads are large, bearded, and have long beaks; the white chaff usually has black stripes. The grain is slightly softer

than that of other hard red winter wheats. It provides farmers with a high-yielding, early variety to use in spreading the harvest period on large acreages.

Wichita has increased rather rapidly in the recommended area, which includes south-central and western Kansas, eastern Colorado, western Oklahoma, and northwestern Texas, an area where approximately 3 million acres were grown in 1949, as shown in figure 8.

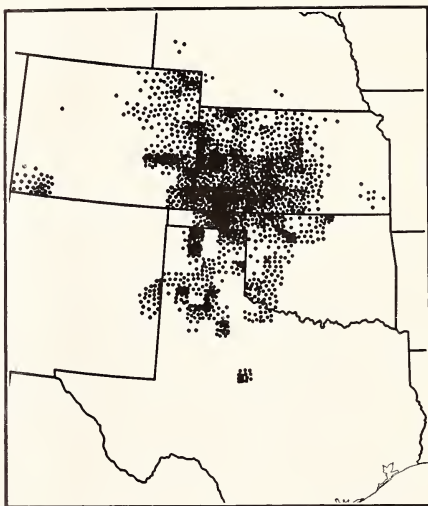


Figure 8.—Wichita distribution in 1949 was 3,004,432 acres.

## TENMARQ

Tenmarq was selected at the Kansas Agricultural Experiment Station, Manhattan, in 1921 from a hybrid between Marquis spring wheat and P-1066 winter wheat, the latter being a sister selection of Kanred from Crimean wheat. The variety is bearded and has white glumes, but it can be distinguished from Turkey by the longer beaks on the outer glumes, slightly larger and more nearly square heads, stronger straw, earlier maturity, and different kernel shape. The kernels are short and egg-shaped with rounded sides, and possess

a large round germ and a prominent, well-delineated brush.

Tenmarq is 2 to 5 days earlier in maturity than Turkey, but it is less winter-hardy, being similar to Blackhull in cold tolerance. It is resistant to a few races of leaf rust and stem rust, but usually is classified as susceptible in the field where several races may attack it. It is susceptible to loose smut, stinking smut, or bunt, and to hessian fly. The milling and baking characteristics are very good, and it is usually ranked as equal to or better than Turkey, long recognized as the acceptable standard. The grain may be 1 to 2 pounds lower in test weight than Blackhull but about the same weight as Turkey. While it bleaches rather easily and shows considerable yellowberry, neither lowers its milling and baking properties. It has given good yields from central Kansas south through Oklahoma and Texas. Farther north it has given high yields only in years when there was no winterkilling or when its earliness was beneficial.

Tenmarq was distributed in 1932 and increased rapidly until 1944, when it was the leading variety in Kansas, Oklahoma, and Texas, with smaller acreages

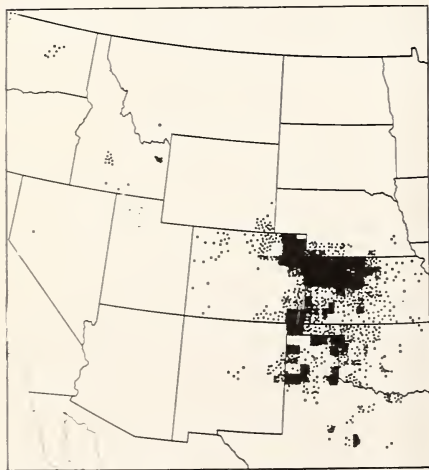


Figure 9.—Tenmarq distribution in 1949 was 2,902,645 acres.

in Nebraska, Colorado, Arizona, and Montana. In 1944, it was estimated to have been grown on more than 8 million acres, a larger acreage than that for any other variety in the United States. Thus, it was the first hard red winter variety to be grown more widely than Turkey. For the most part it replaced Turkey, Blackhull, and Kanred. After 1944 the acreage declined rather rapidly, as it was replaced by Pawnee, Comanche, Triumph, Red Chief, and Wichita. By 1949 it ranked sixth, with about 3 million acres distributed as shown in figure 9. Tenmarq is recommended by the agricultural experiment stations of Kansas, Oklahoma, Texas, Colorado, and Illinois, and is acceptable in the southern counties of Nebraska.

## WESTAR

Westar is a selection from a Kanred-Hard Federation  $\times$  Tenmarq cross made at Denton, Tex. It was developed in cooperative experiments of the Texas Agricultural Experiment Station and the United States Department of Agriculture. The variety was selected for the Texas Panhandle area and was distributed in 1944 from the Amarillo Experiment Station near Amarillo, Tex. In general appearance Westar is very similar to Tenmarq and Comanche, and its grain has acceptable quality characteristics. The variety is highly resistant to some races of leaf rust, but is susceptible to stem rust, septoria, and bunt. It has given high yields of grain in field tests in the southern Plains. Westar is recommended in Texas, New Mexico, and Oklahoma where more than 2 million acres were grown in 1949 (fig. 10). It is also recommended in Illinois where its yield frequently exceeds that of Pawnee.

## EARLY BLACKHULL

Early Blackhull differs from Blackhull principally in being about 8 days earlier and in having shorter straw.



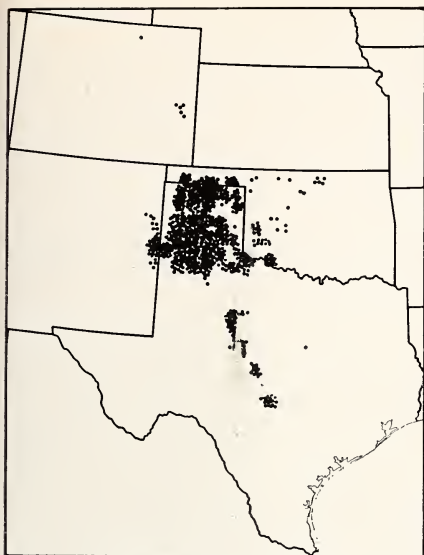


Figure 10.—Westar distribution in 1949 was 2,169,798 acres.

The glumes become striped with black in some seasons; the beaks are short. Early Blackhull and Triumph are the earliest maturing varieties of hard red winter wheat now grown on farms. In comparative experiments it has proved less winter-hardy and also has yielded less on the average than Blackhull. Owing to the fact that the variety shoots and heads very early in the spring, late frosts have caused injury and considerable sterility with accompanying loss in yield, especially in the Central and Southern States. When Early Blackhull escapes winter and spring damage and does not lodge, it gives relatively good yields of heavy test weight grain because of its ability to escape the effects of heat and drought. The variety has a weak straw and often lodges. It has slight, if any resistance to rust, but often escapes serious damage by virtue of its earliness. It is susceptible to bunt, loose smut, and septoria leaf blotch.

Early Blackhull was selected from a field of Blackhull in 1921 by A. P. Haeberle, Clearwater, Kans., who in-

creased and distributed it in 1923. It was grown on about 300,000 acres in 1939, mostly in Kansas, and spread rapidly southward in the decade that followed. More than 2 million acres were grown in 1949, as shown in figure 11. The variety was reported from seven States, with the principal acreage being in the southwestern Plains area. The acreage appears to be decreasing. Undoubtedly the release of Triumph and Wichita, adapted to the same general area, has limited the Early Blackhull

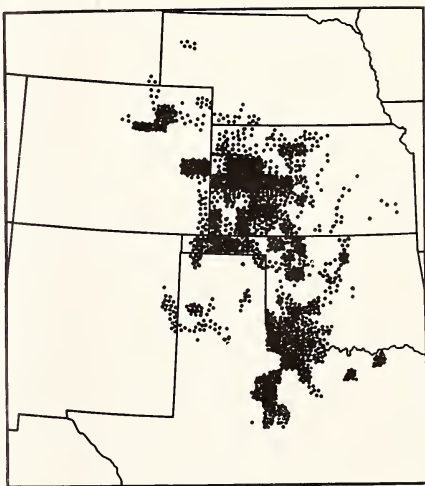


Figure 11.—Early Blackhull distribution in 1949 was 2,106,295 acres.

acreage. As Early Blackhull lacks certain desirable milling and baking characteristics, it is not recommended by any State agricultural experiment station.

## CHEYENNE

Cheyenne is the product of a plant selection from Crimean, the same variety from which Kanred was also selected, made at the Nebraska Agricultural Experiment Station, Lincoln, in 1922. It was distributed in 1930 as Nebraska No. 50, but the seed became mixed, and a purified supply was distributed as Cheyenne in 1933. It

differs from Turkey in being more winter-hardy and in having shorter and much stronger straw, denser and more erect heads, wider shoulders, and shorter beaks on the outer glumes. It does not shatter easily and is considered to be a good variety for combine harvesting. Cheyenne makes a heavier fall growth than Turkey and consequently makes more fall and winter pasture. It is susceptible to bunt, loose smut, scab, and leaf and stem rusts.

Baking characteristics of Cheyenne appear to differ somewhat from those of Turkey in that the dough requires more mixing. If mixed and fermented properly, however, the dough of Cheyenne will produce good bread. It has excellent properties for use in blending with weaker wheats.

Cheyenne has been a high yielder in experimental trials dating back to 1927 at Lincoln, Nebr., and at other stations in Nebraska, Kansas, Oklahoma, and eastern Wyoming. It has spread rapidly in Nebraska since 1933. It was reported for the first time in the 1934 survey, and gradually increased until 1949, when it occupied nearly 2 million acres (fig. 12). It is grown in Nebraska, Kansas, Colorado, Wyoming, and Oklahoma, with smaller acreages in South Dakota, Texas, New Mexico, and Illinois. Nearly two-thirds of the total acreage was reported from Nebraska, where it is most popular in the western counties. It is also grown extensively in adjoining counties of

Colorado, Wyoming, and Kansas. Owing to its susceptibility to stem and leaf rusts, Cheyenne loses popularity during rust epidemics but in other years the variety is a strong favorite. Cheyenne is recommended in Nebraska, Oklahoma, Colorado, and Wyoming.

## BLACKHULL, SUPERHARD, BLUE JACKET, AND RED-HULL

Blackhull, known also as Standard Blackhull, usually can be distinguished from Turkey by its black-striped or solid-black glumes. Under some conditions this black color does not develop, in which case the chaff is white. Blackhull also differs from Turkey in having shorter beaks, in being a little earlier and taller, and in having slightly stiffer straw and somewhat larger and softer kernels. It is decidedly less winter-hardy than Turkey. The variety is susceptible to loose smut and bunt. Blackhull shows some tolerance to leaf and stem rusts and to hessian fly. In some cases its earliness may enable it to escape severe rust damage.

Blackhull originated from three heads found by Earl G. Clark in a field of Turkey near Sedgwick, Harvey County, Kans., in 1912. The heads were grown separately, and the seed was increased by the originator and distributed in 1917.

Blackhull has given yields equal to or better than those of Turkey in the central and southern Plains, where it also has rather consistently surpassed Turkey and Tenmarq in weight per bushel. Owing to its lack of winter hardiness, it should not be grown in sections having severe winters.

When Blackhull was first distributed there was some criticism of its milling and baking quality, since the yield of flour was below expectations based on its weight per bushel; also, the dough was less tolerant to severe mixing and required a shorter mixing time than other hard winter wheats being grown.

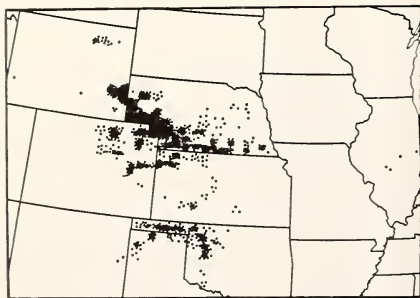


Figure 12.—Cheyenne distribution in 1949 was 1,940,510 acres.



It seemed that this characteristic might limit its usefulness in commercial bakeries, but baking procedures were modified for handling Blackhull. For home baking, where the mixing of dough is not severe, Blackhull produces satisfactory bread.

Blackhull became widely grown in the southern Plains area. The variety reached its peak about 1939. Since then the acreage has steadily decreased in Kansas, Oklahoma, and Texas, where it is being replaced by Pawnee, Comanche, Wichita, Triumph, Westar, and other newer varieties. The extent of its culture is shown in figure 13.

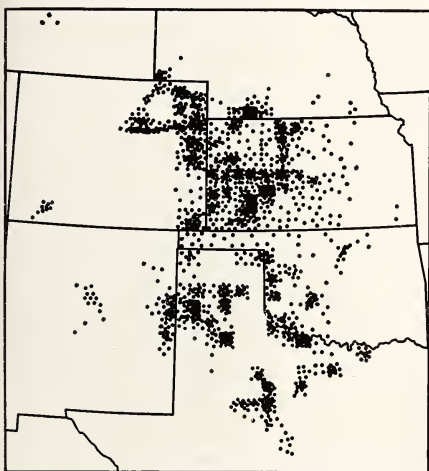


Figure 13.—Blackhull distribution in 1949 was 1,786,492 acres.

Superhard (Superhard Blackhull) is identical with Blackhull except that it has slightly harder kernels and is decidedly poorer in milling and baking quality. It is the result of a selection made from Blackhull in 1920 by the originator of Blackhull. The variety spread rather rapidly for a few years, but it became mixed with Blackhull and its identity has been largely lost. The acreage is small at the present time. It cannot be recommended because of its poor quality.

Blue Jacket, a selection from Superhard Blackhull, released in 1946 by Earl G. Clark, Sedgwick, Kans., resembles Blackhull in general appearance but has stiffer straw, higher test weight, more intense black striping on the chaff, and grows a little taller. It is very susceptible to loose smut, susceptible to the other common wheat diseases, but has some tolerance to injury from the hessian fly. Limited quality tests suggest that Blue Jacket is similar to Blackhull. It was grown on 124,015 acres in 1949 in the southern half of the Great Plains.

Another selection of Blackhull known as Redhull is a mixture of types, the predominating type being awned and having brown glumes with black stripes. The name Bronze Turkey is applied to a similar type. Both are being replaced by better varieties.

## NEBRED

Nebred is a Turkey selection developed at the Nebraska Agricultural Experiment Station, Lincoln. It differs from Turkey in being more resistant to cold and to stinking smut and in having shorter straw and a higher yield per acre. The straw is not so stiff as that of Cheyenne but is quite satisfactory for direct combine harvesting. Nebred is especially susceptible to leaf rust, but is not so susceptible to stem rust as is Turkey.

The quality characteristics of Nebred are usually considered to be excellent, except that the flour has a slightly yellow color which in some cases is objectionable. Nebred is popular in central and western Nebraska, where cold resistance is needed. In eastern Nebraska it has given place to Pawnee.

Nebred was distributed in 1938 and has increased in acreage since that time. In 1949 it was grown on nearly a million and a half acres (fig. 14), mostly in Nebraska, Wyoming, and South Dakota, where it is a recommended variety. It also is grown in Iowa, Kansas, Colorado, Oklahoma, and Texas.

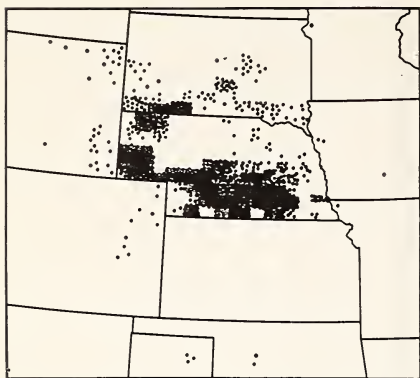


Figure 14.—Nebred distribution in 1949 was 1,457,375 acres.

## RED CHIEF

Red Chief, sometimes called Super-red, has beardless or smooth heads and brown chaff. Under certain conditions the chaff may have black stripes. It ripens at about the same time or a day earlier and has about the same height and cold hardiness as Blackhull. Red Chief was produced by Earl G. Clark, of Sedgwick, Kans. Its exact origin is not known, but it probably originated from a Chiefkan  $\times$  Redhull cross or a cross of similar varieties. It was first distributed to Kansas farmers in 1940, and its acreage increased rapidly, replacing Chiefkan and some other varieties. In 1949 it was grown on more than 1 million acres (fig. 15), mostly in southwestern Kansas and adjacent counties in Oklahoma. It also is grown in Texas, New Mexico, Colorado, Wyoming, Iowa, Missouri, and Nebraska.

Red Chief is susceptible to stinking smut, to loose smut, and to both rusts. Under favorable conditions it yields well and produces grain having high test weight and good kernel color. In fact, the grain is the heaviest and most attractive in appearance of all the hard red winter varieties. It mills fairly well, although it requires more tempering than some other varieties. The dough has poor handling properties, and the loaf volume usually is rather low. Since the quality characteristics

are different and generally inferior for bread-making purposes, the milling trade has not accepted Red Chief and has conducted a vigorous campaign against it. When it was discovered that the kernels could be identified by distinctive markings on the germ, back, and crease, the variety was purchased by millers for limited uses, at a discount, or not at all. The peak acreage was reached in 1945 or 1946, being replaced in recent years by such varieties as Comanche, Pawnee, Westar, Triumph, and Kiowa.

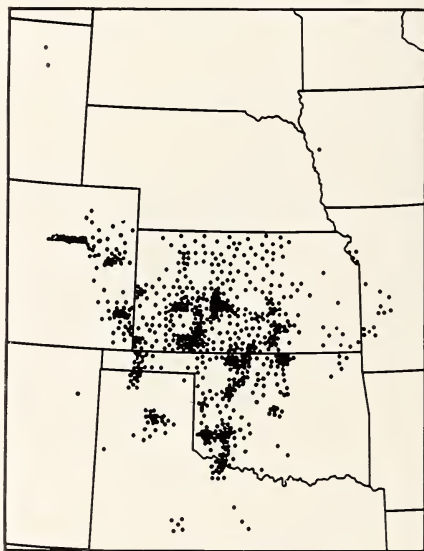


Figure 15.—Red Chief distribution in 1949 was 1,160,893 acres.

## CHIEFKAN

Chiefkan is a beardless, or smooth-headed variety, similar to Red Chief, with white glumes that are generally black-striped. It has much the same growth habit and adaptation as Red Chief. It is moderately resistant to leaf and stem rusts, but it is very susceptible to loose smut, bunt, and septoria. The leaves are often mottled with yellow and brown spots. Its cold resistance is about equal to that of Blackhull. The grain of Chiefkan, like that of Red

Chief, usually may be identified by a "sway-back" and a few other distinctive markings.

The variety was bred by Earl G. Clark of Sedgwick, Kans. It is reported by him to be from a natural hybrid (probably Blackhull crossed with a soft wheat) that was recrossed with Superhard Blackhull. The natural cross occurred in 1916, and the selection which resulted in Chiefkan was made in 1926 and was first distributed in 1935. In 1939 it was reported as being grown in six States with a total of 478,219 acres. By 1944 the total had increased to 1,700,000 acres, of which more than 1 million acres were reported in Kansas, with smaller amounts in Oklahoma, Texas, Colorado, and Nebraska. Recently, with better varieties becoming available, it has declined in acreage and is now a minor variety. As shown in figure 16,

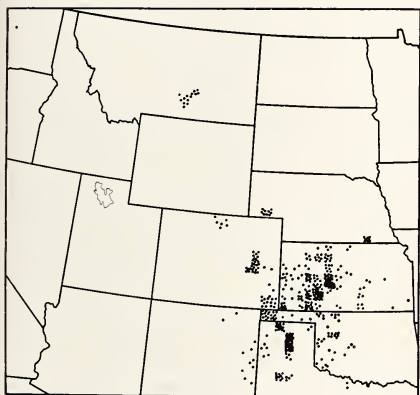


Figure 16.—Chiefkan distribution in 1949 was 425,270 acres.

the acreage was concentrated in southwestern Kansas, western Oklahoma, and in the Texas Panhandle in 1949. Sizable acreages were also reported from New Mexico, Colorado, Nebraska, and Montana.

Chiefkan, like Red Chief, often has been preferred by farmers because of the high test weight and attractive appearance of the grain, its resistance to shattering, and its high yields under

favorable conditions. The variety has been discriminated against by millers, however, because of the poor handling properties of the dough, small loaf volume, and unsatisfactory performance in commercial bakeries.

Kanhull, a sister selection of Chiefkan, has weaker straw and is less productive. It is doubtful if it is grown commercially at the present time.

## YOGO

Yogo was selected at Dickinson, N. Dak., in 1923 from a cross of Minuturki  $\times$  Beloglina-Buffum made in 1919 at the Kansas Agricultural Experiment Station, Manhattan, in cooperation with the United States Department of Agriculture in an attempt to combine cold resistance with yielding ability. The final testing was done at the Judith Basin Branch Station, Moccasin, Mont., from which station it was distributed in 1932. The variety was distributed because of its outstanding winter hardiness, high yield, and resistance to some races of bunt, or stinking smut. It probably is the most cold-resistant hard red winter wheat now grown commercially in the United States. Its quality is not outstanding but is similar to that of Turkey, except possibly for lower water absorption and a slightly smaller loaf volume. The lax, bearded heads are borne on rather tall and weak straw. Beaks on the outer glumes are very short. The kernels are long and slender.

The acreage of Yogo (fig. 17) has increased gradually, with most of it being

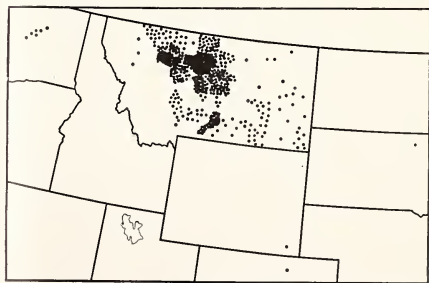


Figure 17.—Yogo distribution in 1949 was 562,186 acres.



reported from Montana. A small acreage is also grown in Washington, South Dakota, Wyoming, and Colorado. In Montana Yogo has made the growing of winter wheat less hazardous, owing to its resistance to winterkilling.

## KARMONT

Karmont is a selection from Kharkof made in 1911 at the Judith Basin Branch Station, Moccasin, Mont. It was first grown commercially in Montana in 1921. The variety is very similar in appearance to Turkey and Kharkof, although it is somewhat more winter-hardy and usually outyields these varieties under Montana conditions. It is equal to Turkey in milling and baking qualities. Karmont is grown primarily in Montana, most of the acreage being in the central part, where it is adapted and recommended. Its acreage is small, as shown in figure 18.

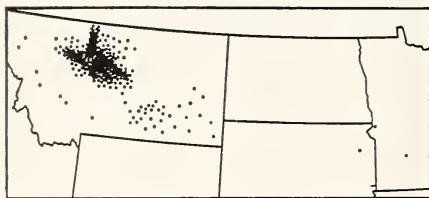


Figure 18.—Karmont distribution in 1949 was 511,371 acres.

## WASATCH

Wasatch was selected from a Relief × Redit cross at the Utah Agricultural Experiment Station, Logan, in cooperation with the United States Department of Agriculture. It has white glumes, is bearded, and has strong straw. Wasatch is resistant to all races of bunt found in Utah, including dwarf bunt. Its quality is fairly satisfactory. The variety was distributed in the dwarf-bunt area of Montana in 1942 and in Idaho in 1944; it is also grown in Utah, central Washington, and western Colorado. Distribution in 1949 is shown in figure 19. Wasatch, Cache,

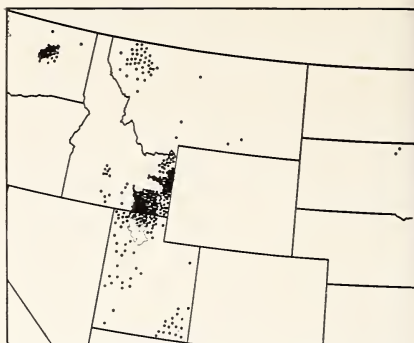


Figure 19.—Wasatch distribution in 1949 was 393,788 acres.

Relief, and certain other varieties have made it possible to grow winter wheat successfully in dwarf-bunt-infested areas.

## KANRED

Kanred originated from a head selected from a strain of Crimean wheat at the Kansas Agricultural Experiment Station, Manhattan, in 1906. This strain of Crimean was very similar to or identical with Turkey and had been imported from Russia by the United States Department of Agriculture in 1900. Kanred was distributed in 1917 after being thoroughly tested in Kansas. It was one of the first improved varieties to be released in the hard winter wheat area. The acreage increased very rapidly until 1924, when it occupied more than 21 percent of the total hard red winter wheat acreage in the United States. Since that time its popularity has gradually declined, owing to its weak straw and the distribution of better adapted varieties. The distribution of Kanred in 1949 is shown in figure 20. It may be grown with success wherever Turkey is grown.

Kanred differs from Turkey chiefly in being resistant to some races of leaf and stem rust, but it is generally susceptible under field conditions because numerous races exist to which it is not resistant. It also is slightly earlier and a little more winter-hardy than Tur-

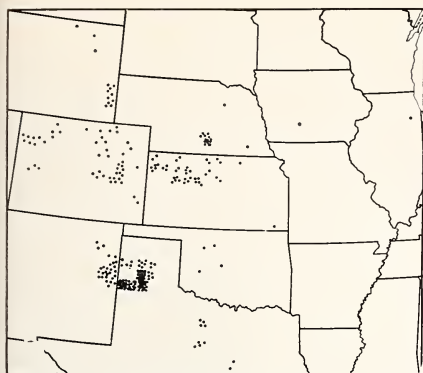


Figure 20.—Kanred distribution in 1949 was 252,049 acres.

key. Usually it can be distinguished from Turkey by the longer beaks on the outer chaff. Kanred has been found to be much the same as Turkey in milling and bread-baking value.

### CACHE

Cache is a beardless variety developed at the Utah Agricultural Experiment Station, Logan, in cooperation with the United States Department of Agriculture, from a cross, Ridit  $\times$  Utah Kanred, made in 1927. The variety was distributed to farmers in Utah in 1937. Cache has given good yields in Utah, but has yielded less than Wasatch in central Montana. It is resistant to the eight common races of bunt found in Utah and is moderately resistant to dwarf bunt where most other varieties are seriously injured. It shatters less and has stronger straw than Utah Kanred, a variety with which it is often compared. Although few quality tests have been made, the data at hand indicate that it is acceptable to the milling trade. It is grown in Idaho, Montana, and Washington where dwarf bunt occurs, and occupied 154,464 acres in 1949.

### RIO

Rio differs from Turkey only in having slightly shorter stems and in being

resistant to many forms of bunt, or stinking smut. It is the result of a head selection made from Argentine, a Crimean wheat, at Moro, Oreg., in 1920, in cooperation between the Oregon Agricultural Experiment Station and the United States Department of Agriculture. It was distributed to farmers in Oregon in 1931. In 1949 it occupied about 115,000 acres, mostly in central Washington, but considerable of what is grown under the name of Turkey in that area is thought to be Rio. Its outstanding characteristics are resistance to many races of bunt, high-yielding ability, and good grain quality.

### IOWIN

Iowin is a selection from Theiss wheat, a strain of Turkey, made at the Iowa Agricultural Experiment Station, Ames. It has been grown commercially since 1930, and was planted on about 95,000 acres in 1949. It differs from Turkey in having longer beaks, purple stems at maturity, and slightly softer kernels, and in being taller and later, and being of lower quality. It is also somewhat resistant to leaf and stem rust. Iowin has given higher yields than Turkey under Iowa conditions. In 1949 the variety was reported in Iowa, Kansas, Nebraska, South Dakota, Oklahoma, Missouri, and Illinois. The principal acreage is in Iowa. The variety has a limited adaptation.

### NEWTURK

Newturk is a selection from a cross between Newton and Turkey made at Moro, Oreg., in 1916. A number of beardless selections from this cross were sent to Moccasin, Mont., in 1920, and the best one of these was named Newturk and distributed in 1926. Its acreage has remained about constant for some time, but the variety was grown only in central and western Montana in 1949 on slightly over 80,000 acres.



Newturk was developed to satisfy a demand for a beardless variety of hard red winter wheat that would yield as well as Turkey or Kharkof. In Montana it yields as well as or slightly better than Kharkof, is resistant to shattering, and has good quality characteristics. While it has been tested in States other than Montana and, in some cases, given fairly good results, Newturk probably is best adapted to Montana, where it is a recommended variety. In Montana Newturk may be used safely by those farmers who desire a beardless wheat. It is not so cold resistant or so bunt resistant as is Yogo and should not replace that variety.

### RIDIT

Ridit was developed at the Washington Agricultural Experiment Station, Pullman, from a cross between Turkey and Florence in an effort to produce a variety of winter wheat resistant to bunt, or stinking smut. The cross was made in 1915, and a beardless selection made from it in 1919 resulted in Ridit. It is resistant to many races of bunt and resistant to shattering, but is not considered a high yielder. It has moderately good quality characteristics. Ridit was first distributed in Washington in 1923 and it increased rapidly for about 10 years. Since that time the acreage has decreased until in 1949 it occupied only 75,027 acres in Washington, Idaho, and Montana.

### BRILL

Brill was the best of 6,000 selections made from Turkey in 1922 in cooperative investigations between the Illinois Agricultural Experiment Station and the United States Department of Agriculture, at Urbana. The selections were made as a part of a search for strains resistant to scab. Brill was designated as Illinois No. 131 until it was named and distributed in 1936. The variety has some resistance to scab, leaf rust, stem rust, flag smut, and

winter injury, and often has less yellow-berry than other hard red winter varieties. It is susceptible to mosaic. About 71,000 acres of this variety were grown in 1949, of which 43,000 were in Illinois. Smaller acreages were reported from Indiana, Michigan, Wisconsin, Missouri, Ohio, New York, New Jersey, and Pennsylvania.

### IOBRED

Iobred was selected from Banat at the Iowa Agricultural Experiment Station, Ames, in 1915. It is a brown-chaffed, bearded variety with shorter and broader kernels than most varieties of hard red winter wheat. In Iowa Iobred is considered superior to many other varieties in winter hardiness, strength of straw, resistance to stem rust, and yield. The milling and baking characteristics of the variety are excellent.

Iobred was grown on 68,427 acres in 1949, mostly in Kansas, Iowa, and Nebraska, and to a lesser extent in Oklahoma, Missouri, and Illinois. Although it has been grown for about 20 years, the acreage has never become very large. It should never be grown extensively in semiarid regions, because of its tendency to shatter. It is recommended for growing only in Iowa.

### PURKOF

Purkof is a beardless variety produced from a hybrid between Michigan Amber and Malakof made in 1912 and selected in 1915 at the Purdue University Agricultural Experiment Station, Lafayette, Ind. It was distributed in 1924 and increased in acreage until about 1939, but has been grown much less extensively since that time. It is grown in Indiana, Illinois, and Pennsylvania, with the principal acreage in Indiana. The superior characteristics of Purkof are high yield, good winter hardiness in the area to which it is adapted, resistance to shattering, and some resistance to leaf rust.

## UTAH KANRED

Utah Kanred differs from Kanred in having longer, laxer, and more nodding spikes, darker glumes, and more variable and shorter beaks, and in being less winter-hardy. The original source of this wheat is unknown. When distributed it was thought to be Kanred and was grown commercially as Kanred for many years. It is now designated as Utah Kanred. This wheat proved to be a high-yielding variety in experiments at the Nephi Dry Land Substation, Nephi, Utah, and was distributed in 1922. It is grown in Utah only, and the acreage is decreasing because of its susceptibility to stinking smut.

## NEBRASKA NO. 60

Nebraska No. 60 is a selection of Turkey made at the Nebraska Agricultural Experiment Station, Lincoln, in 1906 and distributed in 1918. Although it is nearly identical in appearance to Turkey, it is later and more winter-hardy. It is as susceptible as Turkey to rust and smut and to hessian fly attack. It is equal to Turkey in milling and baking value. This variety, rather than Turkey, is recommended where a little more winter hardiness is desired and where earliness is not important. The variety made a good yield record in western Nebraska during early years of testing when later, hardier varieties had an advantage, but more recently Cheyenne and Nebred have yielded better and have replaced it extensively. The variety is grown mostly in western Nebraska, but small acreages were reported in 1949 in Oklahoma and Iowa.

## SHERMAN

Sherman is a selection from a double cross (Budapest  $\times$  Turkey)  $\times$  (Zimmerman  $\times$  Turkey), made in 1908. It was selected in 1915 at Moccasin, Mont., and was first distributed in Sherman

County, Oreg., and later in southern Idaho in 1928. Sherman is very similar to Turkey, but shatters more readily. It is resistant to some forms of bunt. It is grown in Idaho on a small acreage.

## MINTURKI

Minturki is one of the most winter-hardy varieties grown commercially in the United States. It originated from a cross between Turkey and Odessa (the latter a winter-hardy soft wheat), made at the Minnesota Agricultural Experiment Station, St. Paul, in 1902. The variety was released to farmers in 1919, thus being the first hard red winter wheat of hybrid origin to be distributed.

Minturki has given good yields in Minnesota and South Dakota. It finds favor in that area because of its winter hardiness, its resistance to many of the races of stinking smut, or bunt, and its moderate resistance to stem rust. While about the same as other adapted varieties in Minnesota, it ripens later than most varieties of hard red winter wheat, and for this reason is often injured by heat and drought when grown in latitudes south of that State. The variety resembles Turkey, but has more slender heads and longer, softer, and more slender kernels. Minturki offers considerable promise where severe winterkilling may be expected, especially in the subhumid and humid sections of the upper Mississippi Valley. Bread from Minturki is satisfactory in volume and texture, but it is inclined to be slightly yellow.

Minturki is grown in Minnesota, Montana, Wisconsin, and Iowa. Although grown for over 30 years, its acreage remained nearly constant until about 1945, when it gave place to Minter, Marmin, and other new varieties. The Minnesota and South Dakota Agricultural Experiment Stations recommend it for growing in those States.

## MARMIN

Marmin is the result of a Minturki  $\times$  Marquis cross made at the Minnesota Agricultural Experiment Station, St. Paul, in 1922 in experiments cooperative between the Minnesota Agricultural Experiment Station and the United States Department of Agriculture. It was distributed in Minnesota in 1940 because it produces flour and bread of lighter color and is equal to Minturki in winter hardiness and disease resistance. Most of the acreage is in Minnesota, with smaller amounts in Montana, North Dakota, and Illinois. Marmin was removed from the Minnesota list of recommended varieties in 1951 when seed of Minter became available.

## New Varieties

Several new varieties of promise have been distributed recently to farmers. Because of probable interest in them, a brief description of a few follows.

## APACHE

Apache was developed by the United States Department of Agriculture and the Southwestern States in the cooperative hard red winter wheat improvement experiments. The original cross of Cheyenne  $\times$  Early Blackhull was made at Woodward, Okla., in 1932, and the selection later named Apache was isolated at Hays, Kans., in 1937. It was tested widely over the central and southern Great Plains and released by the New Mexico Agricultural Experiment Station in the fall of 1949, where it is recommended for eastern counties. Apache matures midway between Early Blackhull and Comanche and gives high yields of grain with a heavy test weight in the High Plains of the Southwest, but has very weak straw and is susceptible to the major wheat diseases. Milling and baking properties are acceptable.

## CONCHO

Concho was developed cooperatively by the Oklahoma Agricultural Experiment Station, Stillwater, and the United States Department of Agriculture, and was tested widely over the hard winter wheat region. It was selected from the cross Comanche  $\times$  Blackhull-Hard Federation. The original crosses and the early selections were made at the Southern Great Plains Field Station, Woodward, Okla. Concho resembles Comanche somewhat in adaptation and general characteristics but differs in having brown chaff, higher grain yield, resistance to more races of leaf rust, and higher weight per bushel. Concho is especially well adapted to Oklahoma and has made excellent records in tests in the central and southern Plains. Concho was named in 1953.

## IOHARDI

Iohardi is a variety developed from a cross between Iobred and Minhardi, made at the Iowa Agricultural Experiment Station, Ames, in 1935, and released in the fall of 1948. Tests conducted in Iowa and nearby States indicate that it combines the high quality, rust resistance, and stiff straw of the Iobred parent with much more winter hardiness. It is a bearded variety with brown-colored chaff and is similar to Turkey in time of maturity and plant height. Occasionally, the spikes tend to be slightly clavate. It is recommended in Iowa.

## KIOWA

Kiowa was distributed by the Kansas Agricultural Experiment Station in the fall of 1950 from its Fort Hays Branch. It is a bunt-resistant, bearded selection from the cross Chiefkan  $\times$  Oro-Tenmarq, the latter a sister of Comanche. The variety was developed in cooperative experiments conducted by the distributing agency and the United States Department of Agriculture. Kiowa



heads and ripens about the same time or a day earlier than Comanche and can be distinguished from it by the variable, often faint, black stripes that develop on the glumes in most seasons. Kiowa is recommended for the western half of Kansas where it appears to surpass Comanche in stiffness of straw, resistance to shattering and bleaching, weight per bushel, and yield of grain. It is highly resistant to the races of bunt collected in Kansas, but is more susceptible to loose smut and leaf rust than is Comanche. Its milling characteristics appear satisfactory and it is acceptable for bread baking, having somewhat less strength for blending purposes than Comanche and probably more than Pawnee.

## MINTER

Minter was developed at the Minnesota Agricultural Experiment Station, St. Paul, in cooperative experiments with the United States Department of Agriculture, and was distributed jointly in 1948 by the Minnesota and South Dakota Agricultural Experiment Stations. It is a selection from a cross of Hope and Minturki backcrossed once to Minturki. It resembles Minturki in most plant characters, but is highly resistant to many races of stem rust like its Hope parent. Quality tests show that flour from this variety is equally as good as that from Minturki and may be better in color and certain other respects. It is recommended in Minnesota and South Dakota.

## PONCA

Ponca was developed at the Kansas Agricultural Experiment Station, Manhattan, in cooperative experiments with the Field Crops Research Branch and the Entomology Research Branch, United States Department of Agriculture, and tested widely in the southern and central Great Plains. It is a selection from the compound cross (Kawvale  $\times$  Marquillo)  $\times$  (Kawvale

$\times$  Tenmarq). One of the major objectives was to transfer the hessian fly resistance of Marquillo spring wheat to a winter type. Ponca was released jointly by the Kansas and Oklahoma Agricultural Experiment Stations in the fall of 1951. Ponca resembles Pawnee in yield of grain, weight per bushel, time of maturity, strength of straw, plant height, and in resistance to loose smut. It is superior to Pawnee in leaf rust resistance, hessian fly resistance, and dough handling properties, and does not shatter so readily. It is less winter-hardy and is more susceptible to bunt. It is recommended for the eastern parts of Kansas and Oklahoma.

## QUANAH

Quanah was developed for central Texas and the Rolling Plains area of that State, particularly the part where diseases are more important. Possessing high resistance to many important races of leaf and stem rust and to bunt, Quanah is probably the most disease-resistant variety of hard red winter wheat grown commercially. It is a selection from the compound cross (Mediterranean-Hope  $\times$  Comanche)  $\times$  (Comanche  $\times$  Honor-Forward) developed by the Texas Agricultural Experiment Station and the United States Department of Agriculture and tested in cooperative experiments over the entire Plains region. Quanah is similar to Comanche in general appearance and market quality, but differs from it in having greater rust resistance and stronger straw, in being decidedly inferior in winter hardiness and drought resistance, and in being more susceptible to loose smut. It was released in the fall of 1950 and is recommended only in eastern Texas.

## Other Varieties

In addition to the varieties discussed above, Ioturk, Michikof, Mosida, Relief, Sibley 81. and Wisconsin Pedigree No. 2 were grown in 1949 on limited acre-

ages in various parts of the United States. These are old varieties slowly being discontinued. Each was grown on 7,000 acres or less in 1949, except Mosida, which occupied about twice that acreage. Since they are relatively unimportant, descriptions for them are not given.

Several other varieties of hard red winter wheat of recent release are known to exist. They include Reliant, Orienta, Stafford, Red Jacket, Kanqueen (semihard), and Newchief. These are being grown on limited acreages in the Southwest but are not recommended by any State agricultural experiment station.

Reliant is a selection from the cross Kanred  $\times$  Blackhull made in 1924 by Joseph Danne, El Reno, Okla., and released in 1939. It is somewhat earlier, stiffer strawed, and higher yielding than its parents. Orienta was also developed by Mr. Danne. While not identical in appearance, Reliant and Orienta may be described as bearded varieties with white chaff that possess considerable resistance to leaf rust. They are grown on a small acreage in Oklahoma.

Stafford is a selection from Blackhull developed by S. E. Blackburn, Stafford, Kans., and released in 1949 to farmers, mostly in central Kansas. It resembles Blackhull in general characteristics, but differs from it in having white glumes and stiffer, slightly longer straw. In protein quality it may be slightly inferior to Blackhull, having shorter mixing time and lower water absorption.

Red Jacket, Kanqueen, Newchief, and Kanking were developed by Earl G. Clark, Sedgwick, Kans., and first released to farmers in the years 1949, 1949, 1950, and 1952, respectively. Red Jacket resembles Red Chief but is a bearded wheat and may grow slightly taller. Newchief and Kanqueen are beardless varieties resembling Chiefkan. Kanking is similar to Red Jacket but grows shorter. The milling and baking quality of these varieties has not been fully established. Newchief has been consistently unsatisfactory in bread-baking quality in 2 years of testing, while Red Jacket and Kanqueen have given variable results. The latter four varieties are grown on a small acreage.





